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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,838	05/28/2002	Jan Kjellman	STOCP0122US	5757

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EXAMINER

LEURIG, SHARLENE L

ART UNIT PAPER NUMBER

2879

DATE MAILED: 10/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,838	KJELLMAN ET AL.	
	Examiner	Art Unit	
	Sharlene Leurig	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 33-51 is/are allowed.
- 6) ☒ Claim(s) 1,3,5,9,11-13,15,17,21,22,24,26,28-30 and 32 is/are rejected.
- 7) ☒ Claim(s) 2,4,6-8,10,14,16,18-20,23,25,27 and 31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 0102.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Examiner's Notes

1. Line 2 of claims 2, 13, 30, 40 and 50 have commas instead of decimal points.
2. Claims 18 and 19 are identical. One of these claims should be cancelled.
3. In line 2 of claim 20 the term "e.g." should be removed.

Correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Regarding claim 21, the word "means" is preceded by the word(s) "elongate electrically conductive" in an attempt to use a "means" clause to recite a claim element as a means for performing a specified function. However, since no function is specified by the word(s) preceding "means," it is impossible to determine the equivalents of the element, as required by 35 U.S.C. 112, sixth paragraph. See *Ex parte Klumb*, 159 USPQ 694 (Bd. App. 1967).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 21, 22, 24, 26, 28, 29, 30 and 32 and are rejected under 35 U.S.C. 102(b) as being anticipated by Rabinowitz (5,764,004).

Regarding claim 21, Rabinowitz discloses a field emission cathode (Figure 1, element 11) for use in a light source and at least partially encompassed by an anode (15), the cathode being elongate and electrically conductive and being in cylindrical form with a first longitudinal axis, where at least a portion of the cylindrical surface has conductive surface irregularities in the form of carbon nanotubes (Figure 15, element 31), each having a second longitudinal axis perpendicular to the first longitudinal axis. Rabinowitz discloses the length of the nanotubes being about 10,000 nm, which is equivalent to 10 microns (column 18, lines 6-7). Since the nanotubes are partially embedded in the cathode wire, the free ends of the nanotubes must be less than 10 microns.

Regarding claim 22, the wire can be made of tungsten, which is conductive (column 16, lines 8-9).

Regarding claim 24, the wire may be coated with a layer of polytetrafluoroethylene, in which the carbon nanotubes may be disposed, and therefore may be made of an insulating material (column 18, lines 16-20).

Regarding claim 26, the elongate carrier (Figure 15, element 21) has an essentially circular cross-section.

Regarding claim 28, the elongate carrier comprises a wire (column 16, lines 8-9).

Regarding claim 29, since rod can be interpreted as meaning "a long thin implement made of metal", and a wire also fits that description, the elongate carrier can be interpreted as being a rod (column 16, lines 8-9).

Regarding claim 30, the nanometers have a diameter of 10 nm and therefore have a radius of curvature in the range of 0.1 to 100 nm (column 18, lines 6-7).

Regarding claim 32, the nanotube tips are uniformly distributed around the carrier (Figure 15, element 31).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 3, 5, 9, 11-13, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabinowitz (5,764,004) in view of Jones et al. (5,371,431).

Rabinowitz discloses a light source comprising an evacuated container having walls including an outer glass layer (Figure 1, element 16), a phosphor screen (14) forming a luminescent layer, and further comprising a conductive layer forming an anode (15). The phosphor is excited to luminescence when struck by electrons from the

field emission cathode (11) located in the interior of the chamber. The field emission cathode (11) comprises an elongate wire-shaped carrier having a cylindrical surface and a first longitudinal axis, and carbon nanotubes are provided on the cylindrical surface perpendicular to the longitudinal axis of the cathode (Figure 15, element 31). Rabinowitz discloses the length of the nanotubes being about 10,000 nm, which is equivalent to 10 microns (column 18, lines 6-7). Since the nanotubes are partially embedded in the cathode wire, the free ends of the nanotubes must be less than 10 microns.

Rabinowitz lacks disclosure of a phosphor layer formed on the glass layer as a coating, instead disclosing a phosphor screen.

Jones teaches a phosphor coating on a glass wall as part of a display device (column 15, lines 21-22).

Therefore regarding claim 1, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Rabinowitz's light source with a phosphor coating formed on the outer glass layer in order to obviate the need for an independent phosphor screen, as taught by Jones, and thereby lower the weight of the device.

Regarding claim 3, Rabinowitz discloses that the wire can be made of tungsten, which is conductive (column 16, lines 8-9).

Regarding claim 5, Rabinowitz discloses that the wire may be coated with a layer of polytetrafluoroethylene, in which the carbon nanotubes may be disposed, and therefore may be made of an insulating material (column 18, lines 16-20).

Regarding claim 9, Rabinowitz discloses that the elongate carrier (Figure 15, element 21) has an essentially circular cross-section.

Regarding claim 11, Rabinowitz discloses that the elongate carrier comprises a wire (column 16, lines 8-9).

Regarding claim 12, since rod can be interpreted as meaning "a long thin implement made of metal", and a wire also fits that description, the elongate carrier can be interpreted as being a rod (column 16, lines 8-9).

Regarding claim 13, Rabinowitz discloses that the nanometers have a diameter of 10 nm and therefore have a radius of curvature in the range of 0.1 to 100 nm (column 18, lines 6-7).

Regarding claim 15, Rabinowitz discloses that the nanotube tips are uniformly distributed around the carrier (Figure 15, element 31).

Regarding claim 17, Rabinowitz discloses that the anode (15), which is transparent (column 5, lines 5-6) is arranged between the glass layer (16) which is in the form of a box and the luminescent layer (14) which is formed only on one side of the glass box.

Allowable Subject Matter

11. Claims 2, 4, 6-8, 10, 14, 16, 18-20, 23, 25, 27 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The Examiner notes that the Prior Art of Record discloses a light source having

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a cathode comprised of a cylindrical surface with a longitudinal axis and a plurality of nanotubes disposed on the cathode perpendicular to that axis.

Regarding claim 2, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claim 2, and specifically comprising the limitation of the cylindrical surface of the carrier having a diameter in the claimed range.

Regarding claims 4 and 23, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claims 4 and 23, and specifically comprising the limitation of the carrier being made of a semi-conductive material.

Regarding claim 6, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claim 6, and specifically comprising the limitation of the container having a cylindrical shape and a diameter in the claimed range.

Regarding claims 7 and 8, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claims 7 and 8, and specifically comprising the limitation of the carrier being arranged either concentrically or eccentrically within the container.

Regarding claim 16, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claim 16, and specifically comprising the limitation of the anode being made of a reflective material.

Regarding claims 18 and 19, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claims 18 and 19, and specifically comprising the limitation of phosphor layer being formed of a conductive phosphor and being part of the anode.

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Regarding claim 20, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claim 20, and specifically comprising the limitation of the container being in the shape of a curved tube.

Regarding claim 25, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claim 25, and specifically comprising the limitation of the carrier being partially encompassed by an anode having a cylindrical shape and a diameter in the claimed range.

Regarding claims 10 and 27, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claims 10 and 27, and specifically comprising the limitation of the carrier having a non-circular cross-section with a smooth curve.

Regarding claims 14 and 31, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claims 14 and 31, and specifically comprising the limitation of the nanotubes being arranged on the carrier in the form of a film.

12. Claims 33-51 are allowed.

The following is an examiner's statement of reasons for allowance: The Examiner notes that the Prior Art of Record discloses a light source having a cathode comprised of a cylindrical surface with a longitudinal axis and a plurality of nanotubes disposed on the cathode perpendicular to that axis.

Regarding claims 33-51, the Prior Art of Record fails to teach or suggest the combination of the limitations as set forth in claims 33 and 45, and specifically

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comprising the limitation of the cathode comprising a spherical surface having nanotubes disposed perpendicularly to the surface of the carrier.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (703)305-4745. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703)305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Sharlene Leurig
September 11, 2003

SL


ASHOK PATEL
PRIMARY EXAMINER